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On the Opposition of the Minor Planet Ariadne as a means of determining the Solar Parallax. By Mr. David Gill.

The minor planet *Ariadne* (43) is in opposition on July 24 of the present year, in circumstances very favourable for determining its diurnal parallax by the heliometric method. The distance of the planet from the Earth is 0·83, the Sun's mean distance from the Earth being 1.

Its declination (−15°) is not far from the most favourable position for observation at Ascension, and opposition occurs ten days before it is possible to begin to observe *Mars* satisfactorily. The observations can therefore be made without inconvenience or additional expense.

It is true the planet is somewhat faint (8·8 mag.), but experience at Mauritius has taught me that with such a heliometer as Lord Lindsay's, in a tropical sky, 8·5 mag. stars can be measured with more accuracy than any other, and that 9th mag. stars can be well measured in favourable atmospheric conditions.

The geometrical conditions are very much more favourable than in the case of *Juno* (the distance of *Juno* at opposition was 1·05); and, besides, it is possible to select more suitable stars of comparison. The opportunity therefore appears a very good one, and I have accordingly selected stars of comparison, of which the subjoined is a list.

In addition to this list, absolutely required for comparison with the planet, are a few stars required in the triangulation of the comparison stars, the latter are denoted by Greek letters.

The plan of observation is given in connection with the following tables, as also the plan of triangulation of the stars of comparison.

I shall be greatly indebted to any astronomer who will assist this determination in any of the following ways:—

1. By meridian observations of the stars of comparison.

2. By extra-meridian determinations of the difference of R.A. and declination of any of the stars of comparison, but especially by accurate measures of the difference of declination of the stars *f*, *c*. These stars will be used by me to determine the zero of the position-circle in the triangulation, and, as they do not differ 2′ in declination, the observation can be made by means of the wire micrometer with very great accuracy.

3. By heliometer measures, either of the star and planet, or of the distances and position-angles of the stars included in the plan of triangulation.

4. By a series either of meridian or extra-meridian observations of the planet, extending as far as possible on both sides of opposition.

The oppositions of *Iris* (7) and *Melpomene* (18) are also very favourable. I will notice them more at length at the next meeting of the Society.

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Stars to be observed with Ariadne at Opposition 1877.

Adopted Name of Star.	Approximate R.A. h m s	Approximate Dec. ° ′	No. in Oeltzen's Argelander.		No. in Lalande.		No. in Weisse's Bessel.		No. in Santini.		Remarks.
a	20 8 28	−15 8	20345	8–9							
b	20 12 9	−14 39	20392	7–8							
c	20 12 57	−15 23	20407	8							
d	20 16 34	−14 39	...	...	39140	7½	...		...		Also in Berlin Acad. Star Cat.
e	20 18 24	−15 13	20489	8–9	39210	8½					
f	20 19 10	−15 22	20496	7–8	39247	8					
α	20 19 27	−14 16	...	...	...	...	xx. 445	8	1850	7–8	
β	20 22 8	−15 27	20541	9							
γ	20 25 2	−14 11	...	...	39486	8	588	9	1859	9	
g	20 27 21	−14 9	...	...	39579	7	646	7	1865	7	
k	20 27 52	−14 52	...	...	...	...	664	9			
h	20 29 23	−15 44	20642	8	39671	9					

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Plan of Heliometric Triangulation of Stars to be compared with Ariadne.

Stars.	Mag.	R.A.			Dec.		Position Angle.	Dist.
		h	m	s	°	′	°	′
a—*b*	8-9—7-8	20	10	19	−14	54	241·6	61
a—*c*	8-9—8		10	43	15	16	283·0	67
b—*c*	7-8—8		12	33	15	1	345·2	46
b—*d*	7-8—7-8		14	22	14	39	270	64
b—*e*	7-8—8-9		15	17	14	56	290·6	97
b—α	7-8—7-8		15	48	14	28	257·8	108
c—*d*	8—7-8		14	46	15	1	230·0	68
c—*e*	8—8-9		15	41	15	18	262·8	80
c—α	8—7-0		16	12	14	50	234·6	116
d—*e*	7-8—8-9		17	29	14	56	322·0	43
d—*f*	7-8—7-8		17	52	15	1	318·8	57
d—α	7-8—7-8		18	1	14	28	241·2	48
d—β	7-8—9		19	21	15	3	300·7	94
e—*f*	8-9—7-8		18	47	15	18	309·0	14
e—α	8-9—7-8		18	56	14	45	195·0	59
e—β	8-9—9		20	16	15	20	284·5	56
e—γ	8-9—8-9		21	43	14	42	237·2	114
f—α	7-8—7-8		19	19	14	49	183·7	66
f—β	7-8—9		20	39	15	25	276·6	43
f—γ	7-8—8-9		22	6	14	47	230·2	111
g—*h*	7—8-9		28	22	14	57	342·8	99
g—α	7—7-8		23	24	14	13	86·5	115
g—β	7—9		24	45	14	48	44·2	109
g—γ	7—8-9		26	12	14	10	86·6	34
h—β	8-9—9		25	46	15	36	99·2	106
h—γ	8-9—8-9		27	13	14	58	145·9	112
α—β	7-8—9		20	48	14	52	331·2	81
α—γ	7-8—8-9		22	15	14	14	226·5	81
β—γ	9—8-9		23	35	14	48	209·0	87
k—*g*	9—7		27	37	14	31	170·0	44
k—*h*	9—8-9		28	38	15	18	337·0	57
k—β	9—9		25	0	15	10	67·8	90
k—γ	9—8-9	20	26	27	−14	32	134·9	58

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Plan of Observations of Ariadne and Comparison Stars.

[P denotes the planet; other letters the stars in the preceding list.]

Day. 1877.	Stars of Comparison.	Mag.	Hour Angle −4h (Evening Observations). R.A. of Middle Point.			Dec. of Middle Point.		Position Angle.	Distance.	Hour Angle +4h (Morning Observations). R.A. of Middle Point.			Dec. of Middle Point.		Position Angle.	Distance.
			h	m	s	°	′	°	′	h	m	s	°	′	°	′
July 13	P—*f*	7–8	20	22	40	−15	10	76·7	104	20	22	31	−15	10	76·1	100
	P—*g*	7		26	46	14	34	199·3	52		26	37	14	34	203·8	54
	P—*h*	8–9		27	47	15	21	314·6	65		27	38	15	21	312·0	69
	P—*k*	9		27	1	14	55	255·5	26		26	52	14	55	257·7	30
14	P—*f*	7–8		22	13	15	10	74·8	92		22	4	15	10	74·1	87
	P—*g*	7		26	19	14	34	211·7	58		26	10	14	34	215·2	60
	P—*h*	8–9		27	20	15	21	307·6	75		27	11	15	21	305·7	79
	P—*k*	9		26	34	14	55	260·7	38		26	25	14	55	261·8	43
15	P—*f*	7–8		21	46	15	10	72·3	79		21	37	15	10	71·3	75
	P—*g*	7		25	52	14	34	221·5	65		25	43	14	34	224·2	68
	P—*h*	8–9		26	53	15	21	302·3	86		26	44	15	21	300·8	90
	P—*k*	9		26	7	14	55	263·3	51		25	58	14	55	263·8	55
16	P—*e*	8–9		20	56	15	6	78·6	75		20	47	15	6	78·0	70
	P—*g*	7		25	24	14	34	229·0	75		25	15	14	34	231·3	78
	P—*h*	8–9		26	25	15	21	298·2	97		26	15	15	21	297·0	101
	P—*k*	9		25	40	14	55	264·7	64		25	30	14	55	265·0	69
17	P—*d*	7–8		19	33	14	49	102·4	88		19	23	14	49	103·1	84
	P—*f*	7–8		20	51	15	10	63·8	54		20	41	15	10	61·4	50

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	P—*g*	7	24 56	14 34	235·1	86	24 47	14 34	236·7	89
	P—*k*	9	25 12	14 55	265·5	78	25 2	14 55	265·8	82
18	P—*d*	7–8	19 4	14 49	104·7	75	18 55	14 49	105·6	71
	P—*f*	7–8	20 22	15 10	55·4	42	20 13	15 10	51·8	39
	P—*g*	7	24 28	14 34	239·7	97	24 19	14 34	241·0	101
	P—*k*	9	24 43	14 55	266·1	92	24 34	14 55	266·2	96
19	P—*d*	7–8	18 36	14 49	108·4	62	18 27	14 49	109·8	58
	P—*e*	8–9	19 31	15 6	65·8	35	19 22	15 6	62·6	31
	P—*k*	9	24 15	14 55	266·5	105	24 6	14 55	266·6	110
	P—*c*	8	16 47	15 11	77·6	114	16 38	15 11	77·1	110
	P—*β*	9	21 23	15 13	322·2	36	21 14	15 13	317·1	39
20	P—*c*	8	16 18	15 11	76·0	100	16 9	15 11	75·5	96
	P—*d*	7–8	18 7	14 49	113·9	49	17 58	14 49	116·3	45
	P—*e*	8–9	19 2	15 6	52·0	23	18 53	15 6	44·6	20
	P—*α*	7–8	19 33	14 37	176·1	43	19 24	14 37	178·1	43
	P—*β*	9	20 54	15 13	308·1	46	20 45	15 13	304·7	49
21	P—*b*	7–8	15 25	14 49	102·0	97	15 16	14 49	102·7	93
	P—*c*	8	15 49	15 11	74·0	86	15 40	15 11	73·3	82
	P—*d*	7–8	17 38	14 49	123·3	37	17 29	14 49	127·7	33
	P—*e*	8–9	18 33	15 6	16·6	14	18 24	15 6	359·0	14
	P—*α*	7–8	19 4	14 38	194·4	45	18 55	14 38	199·7	46
	P—*β*	9	20 25	15 13	299·0	57	20 16	15 13	296·9	61
22	P—*b*	7–8	14 56	14 49	104·4	83	14 47	14 49	105·3	79
	P—*c*	8	15 20	15 11	71·6	73	15 10	15 11	70·4	69

C C

Day. 1877.	Stars of Comparison.	Mag.	Hour Angle −4h (Evening Observations).							Hour Angle +4h (Morning Observations).							
			R.A. of Middle Point.			Dec. of Middle Point.		Position Angle.	Distance.	R.A. of Middle Point.			Dec. of Middle Point.		Position Angle.	Distance.
			h	m	s	°	′	°	′	h	m	s	°	′	°	′
July 22	P—*e*	8–9	20	18	4	−15	6	323·1	17	20	17	54	−15	6	312·1	20
	P—*a*	7–8		18	35	14	38	210·0	50		18	26	14	38	214·2	53
	P—*β*	9		19	56	15	13	293·1	70		19	46	15	13	291·6	74
23	P—*c*	8		14	51	15	12	67·4	60		14	41	15	12	66·0	55
	P—*d*	7–8		16	40	14	50	172·9	21		16	30	14	50	185·1	22
	P—*e*	8–9		17	35	15	7	297·9	27		17	25	15	7	293·0	31
	P—*a*	7–8		14	27	14	50	221·4	59		14	18	14	50	224·6	62
24	P—*c*	8		14	22	15	12	61·7	47		14	12	15	12	59·1	43
	P—*b*	7–8		13	58	14	50	112·7	57		13	48	14	50	114·5	53
	P—*e*	8–9		17	6	15	7	287·7	40		16	56	15	7	285·7	44
	P—*d*	7–8		16	11	14	50	207·7	25		16	1	14	50	214·4	27
25	P—*a*	8–9		11	39	15	4	86·0	93		11	30	15	4	86·0	88
	P—*b*	7–8		13	30	14	50	120·5	45		13	21	14	50	123·8	41
	P—*e*	8–9		16	37	15	7	282·4	53		16	28	15	7	281·3	57
	P—*d*	7–8		15	42	14	50	228·0	34		15	33	14	50	232·6	38
26	P—*a*	8–9		11	10	15	5	85·8	79		11	1	15	5	85·8	74
	P—*b*	7–8		13	1	14	51	132·6	34		12	52	14	51	139·8	31
	P—*e*	8–9		16	8	15	8	279·3	67		15	59	15	8	278·4	71
27	P—*a*	8–9		10	41	15	6	85·7	64		10	32	15	6	85·6	60
	P—*b*	7–8		12	32	14	51	155·6	26		12	23	14	51	165·3	25
	P—*e*	8–9		15	39	15	8	277·1	80		15	30	15	8	276·5	85

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28	P—*a*	8–9		10	13	15	6	85·4	51		10	4	15	7	85·3	46
	P—*b*	7–8		12	3	14	51	186·6	25		11	54	14	52	196·1	26
	P—*d*	7–8		14	16	14	51	249 6	71		14	7	14	52	250·6	76
	P—*e*	8–9		15	11	15	8	275·6	94		15	2	15	9	275·2	98
29	P—*a*	8–9		9	45	15	6	85·1			9	36	15	7	84·9	33
	P—*b*	7–8		11	35	14	52	212·6	31		11	26	14	53	218·7	33
	P—*c*	8		11	59	15	14	302·7	34		11	50	15	15	299·1	37
30	P—*a*	8–9		9	17	15	7	84·7	24		9	8	15	7	84·3	19
	P—*b*	7–8		11	8	14	52	227·8	40		10	59	14	52	231·8	44
	P—*c*	8		11	31	15	14	292·3	45		11	22	15	14	290·3	49
31	P—*a*	8–9		8	50	15	7	83·4	10		8	40	15	7	81·2	7
Aug. 1	P—*a*	8–9	20	8	22	−15	8	270·0	3	20	8	13	−15	8	270·0	7

Notes.

July 13. If *k* is bright enough it will be best to use the stars *f* and *k* to determine the parallax, measuring to *g* and *h* only once. If *k* be too faint then *g* and *h* must be symmetrically measured.
14. Same remarks apply as to July 13.
15. Do. do.
16. Parallax to depend on *k* and *e*, if *k* bright enough; if not, use *g* and *h*, as on July 13.
17. Endeavour to measure all stars; if only time for once, then in following order—*k*, *d*, *f*, *g*; if *k* too faint, measure *g* twice, thus—*d*, *g*, *g*, *f*.
18. Same as on 17th.
19. If *k* bright enough, use *k*, *c*, and *β*; if not, measure *f*—*d*, P—*d*, P—*f*.

July 20. Endeavour to measure all these in the following order:
21. Measure *a*, *b*, *c*, *β*.
22. Same as 21st.
23. Measure *c*, *e*, *a*, and *d*.
24. Measure *c*, *e*, *d*, and *b*.
25. Measure *a*, *e*, *d*, and *b*.
26. Parallax depends on *a* and *e*; measure *b* once only.
27. Same as 26th.
28. Same as 26th.
29. Measure *a* twice; *b* and *c* once each.
30. Same as 29th.
31. Measure position-angles also.
Aug. 1. Same as 31st.